

Isolated Bidirectional DC Converters for Distributed Battery Energy Applications, Phase I

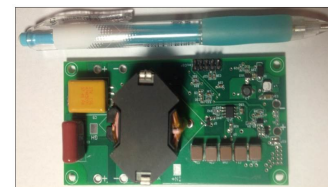
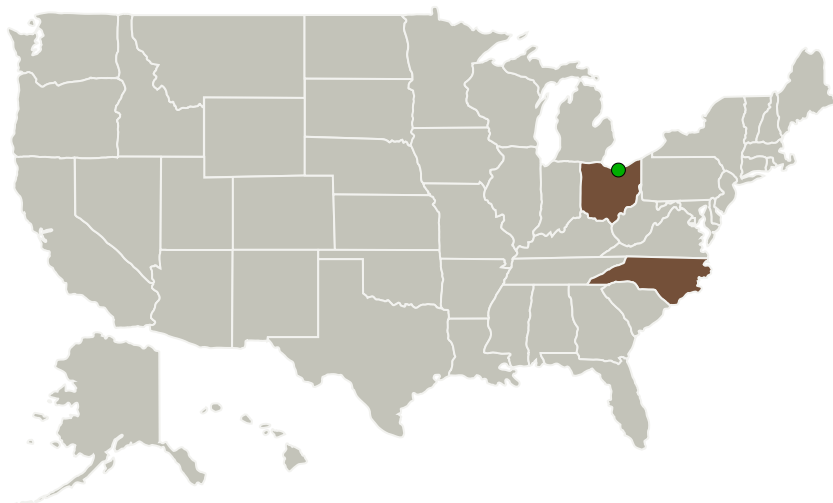
Completed Technology Project (2014 - 2014)



Project Introduction

Power systems are the core heartbeat of any advanced vehicle. Reliability and flexibility of these systems are therefore of the highest priority. This Phase 1 project proposes a highly efficient and modular isolated bidirectional DC converter for battery energy applications. GridBridge is utilizing advanced DC converter topologies for modernization of the today's electrical distribution power grid and will translate work into high priority NASA power system applications, demonstrating transferability, robustness, and scalability. This bidirectional DC converter offers an extremely high power density and will utilize a novel hybrid resonance and PWM technique to achieve. It will also offer NASA the flexibility for many power system topologies, including: distributing large single cells throughout the vehicle, use of smaller cells in a centralized location, or a combination banked smaller cells distributed throughout the system. This is accomplished through independent charging and discharging control of state-of-charge and state-of-health for each battery module, inherent active maximum current limit and short-circuit protection, and ease of module balancing.

Primary U.S. Work Locations and Key Partners



Basic unidirectional DC converter for grid-scale apps, used as basis for proposed Phase 1 research.

Isolated Bidirectional DC
Converters for Distributed
Battery Energy Applications
Project Image

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

Isolated Bidirectional DC Converters for Distributed Battery Energy Applications, Phase I

Completed Technology Project (2014 - 2014)



Organizations Performing Work	Role	Type	Location
GridBridge, Inc.	Lead Organization	Industry	Raleigh, North Carolina
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

North Carolina	Ohio
----------------	------

Project Transitions

**July 2014:** Project Start**December 2014:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137715>)

Images

**Project Image**

Isolated Bidirectional DC Converters for Distributed Battery Energy Applications Project Image (<https://techport.nasa.gov/image/127632>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

GridBridge, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

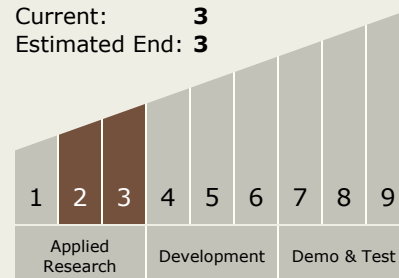
Carlos Torrez

Principal Investigator:

Chad Eckhardt

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



Isolated Bidirectional DC Converters for Distributed Battery Energy Applications, Phase I

Completed Technology Project (2014 - 2014)



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.3 Power Management and Distribution
 - └ TX03.3.3 Electrical Power Conversion and Regulation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System